The RATIONAL TECHNIQUE *for the* EDENTULOUS CASE

RATIONAL

PRESENTATION OF A *NEW* METHOD OF ENSURING DENTURE SATISFACTION IN EVERY EDENTULOUS CASE

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The
RATIONAL TECHNIQUE
for the
EDENTULOUS CASE

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THE AMALGAMATED DENTAL CO., LTD.

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Foreword

THE subject of articulation, particularly in relation to the edentulous case, is one that has held the attention of dentists in every part of the world. Considering the many and varied articulating devices that have been introduced to the profession in the last decade, it would appear to be quite unnecessary to add to an already long list. The dental profession are asked, however, to consider the subject matter within these pages, when the thought that prompted the development of the Rational Articulator will be well understood.

With the introduction of the Rational Articulator, no claims are made as to new theories or as to means of establishing jaw movements that have not already been well covered by various authorities in their respective writings. The object has been to study the more important of the findings and claims so far advanced and to select and collate in concise form such material as may be applied in a practical way by the average dentist.

This practical application is greatly facilitated by the Rational Articulator. This new appliance is an essentially practical laboratory instrument. It will be received with enthusiasm by all who seek better results in denture work.

Consistently good result in articulation depends to no small extent upon the mechanical accuracy of the articulator. The Rational Articulator is so robustly constructed that it cannot easily become damaged or dislocated ; its joint mechanism is designed so that it remains constant, a feature which effectively eliminates accidental error.

No attempt is made in the following pages either to prove or to disprove the many and various published opinions regarding jaw movements. In compiling this work we have sought to avoid all points of a controversial nature, and to confine ourselves strictly to the task of presenting to the profession a practical instrument and a soundly practical and workable technique.

It is felt that up to this time the question of articulation has become so involved as to obscure much of the value of established principles.

Registrations of jaw movements have little point unless their practical application results in dentures providing some additional efficiency for the patient. By efficiency may be implied greater comfort, greater stability or greater masticating power.

For the purpose of clarity, Tooth Forms, Tooth Alignment, the Rational Articulator and Technique for Use will be dealt with under separate headings, and it is hoped that by individual consideration of these factors some definite understanding may be arrived at, as to the principles underlying success with the edentulous case.

London, October, 1931. *S.E.O.*

PART ONE

A Close Examination of the Relative Value of the Various Forms of Posterior Artificial Teeth

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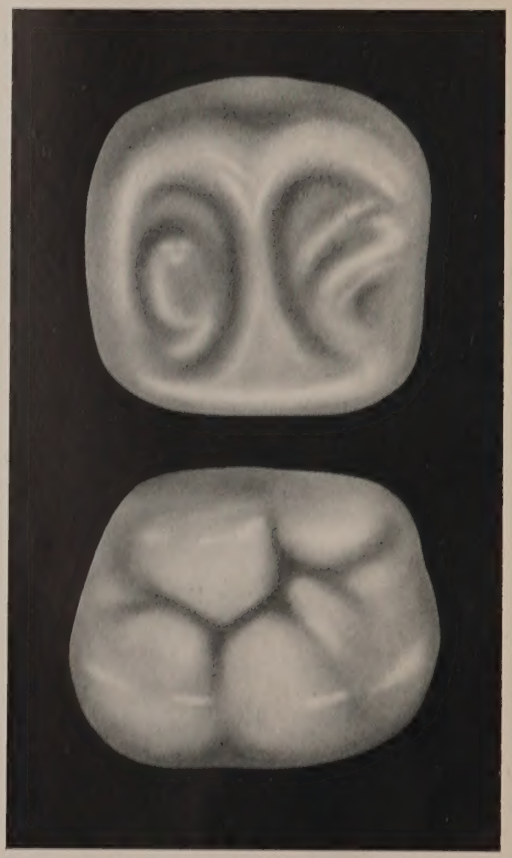
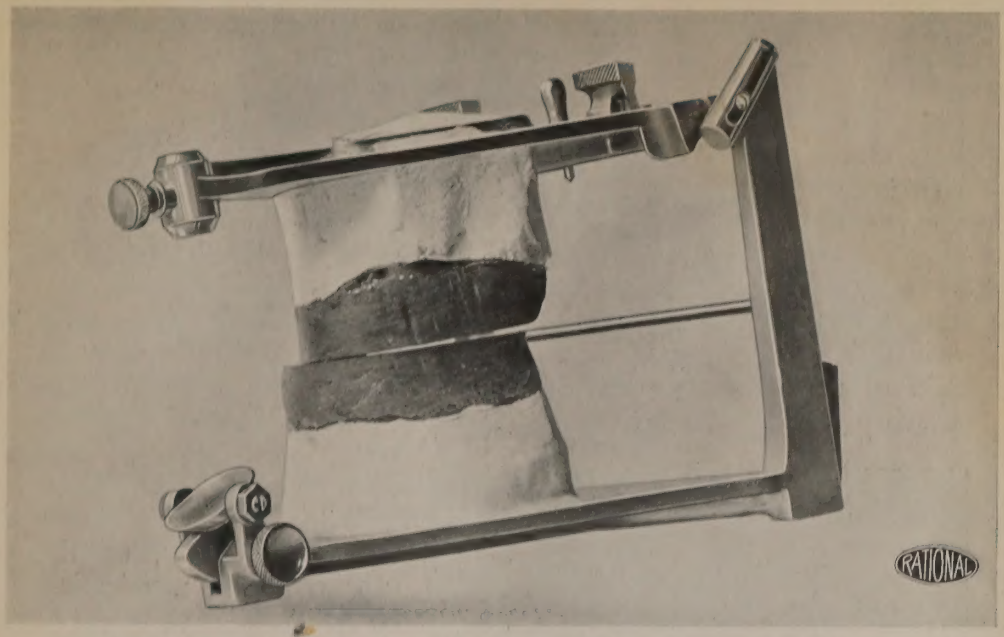
A Close Examination of the Relative Value of the Various Forms of Posterior Artificial Teeth

THE study of the relative value of different artificial tooth forms makes very interesting reading, and with a clear understanding of the constitution of efficient tooth forms comes the elucidation of many of the problems of so-called anatomical articulation.

The methods of overcoming certain difficulties in the edentulous case before anatomical articulators received such prominence are worth recalling. In these earlier stages of development, teeth presenting natural cusp forms created an interlocking of the dentures, restricting normal movements, and the leverage strain set up by pronounced cusps was more than could be tolerated in dentures which are insecurely fixed to the base. The general consensus of opinion at that time was that dentures presenting flat occluding surfaces offered some crushing power, and by extending the range of movements were to be preferred to the artificial denture constructed with teeth carrying natural tooth forms.



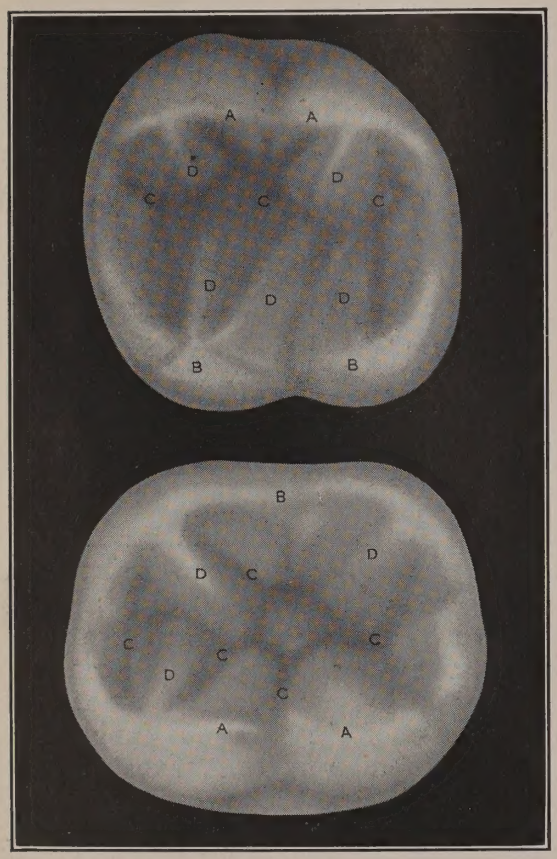
Enlarged occlusal views of (top) old type ineffective molar and (bottom) natural pattern tooth.



Showing flat occlusal surfaces in lateral movement. Note space between the bite blocks. In the mouth dentures presenting such surfaces would be displaced. *(See page six.)*

From this a lesson has been learned. Freedom of movement is a very valuable factor in the function of artificial dentures and leverage strain a matter calling for reduction to the absolute minimum. With this thought in mind, attention was concentrated on the construction of a posterior tooth that would take care of these essential points, and yet incorporate on the occlusal surfaces some formation that would afford a degree of masticating efficiency that could not be obtained with flat surfaces. This opened up a large field for investigation. It would appear that certain individual lines of research have been followed, with the result that several distinct and differing solutions of the problem have been eventually presented. The main feature of many of these solutions indicates that the problem has been approached along lines showing a clear departure from the purely anatomical idea of design, with a more definite tendency to the mechanical. The more important of these various individual researches are exemplified in the presentation of teeth of mechanical design following an arrangement of channels, a further series presenting scissor type facets. Other efforts reverted to a pestle and mortar arrangement of the opposing teeth; teeth were also presented in which the normal arrangement of the cusps was reversed. Some of these types of arrangement in point of fact can be discerned in very early designs of artificial teeth.

Unquestionably each of these individual endeavours dealt with essential factors in the articulation problem. The complete solution of the problem, however, that is, approaching the matter from the point of view of meeting as far as possible every practical requirement in the restoration of natural function, definitely lies in a practical and effective combination of all of these individual and essential factors. Commencing our examination of the features presented by the so-called conventional forms of posterior teeth, a study as to whether conventional forms actually offer the stability and freedom of movement which superficially they appear to do, is interesting and a matter demanding the close attention of all earnest workers in this particular field of restorative dentistry. Practical experiment indicates very clearly that in the development of conventional forms of posterior teeth, consideration has been given first to stability, then to freedom of movement, and lastly, to the degree of masticating efficiency.

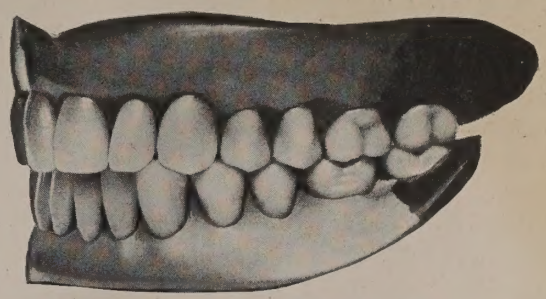


Enlarged occlusal views of "Anatoform" molars. The scientific features of design which enable these teeth to function efficiently under artificial conditions, also facilitate the work of setting up.

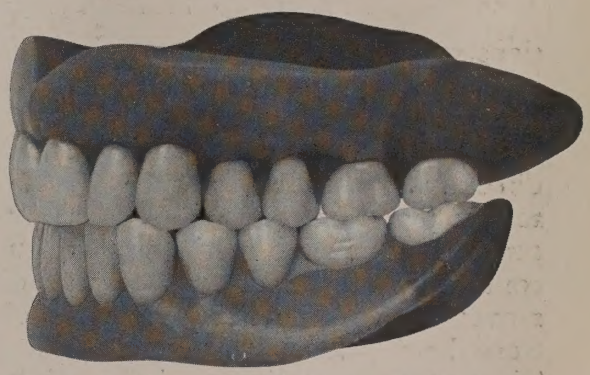
If plane, flat surfaces, for instance, are adopted for the teeth, does stability necessarily follow? A simple experiment will prove this idea to be fallacious. Freedom of movement, yes, but stability, no, unless the alignment of the flat surfaces is in absolute and perfect accord with that of the individual jaw movement.

The experiment is best carried out on a patient presenting flat ridges. Let any dentist establish first the correct bite in any manner he chooses, and place casts and bite in an articulating frame, then conform new bite blocks with flat surfaces, and so

formed as to be in perfect apposition in centric relationship. When these bite blocks with flat surfaces are inserted in the mouth and the patient carries out various jaw movements, it will be found that these surfaces, which were in perfect apposition in centric occlusion, are only touching in places when the jaw moves in its various excursions. The bite blocks, it will be noticed, become unseated and considerable movement is observed, proving that although freedom of movement is provided for, stability has not been obtained. It is readily seen that conventional teeth presenting such flat surfaces in alignment and representing in effect a complete unit from the tuberosity on the one side to the other, will require very precise adjustment over their complete breadth if anything approaching stability is to be secured.

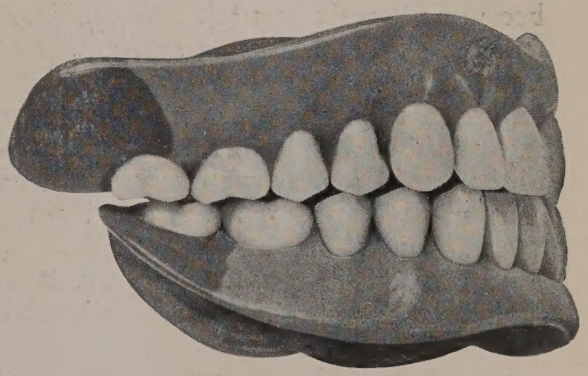


" Anatoform " dentures in central occlusion.

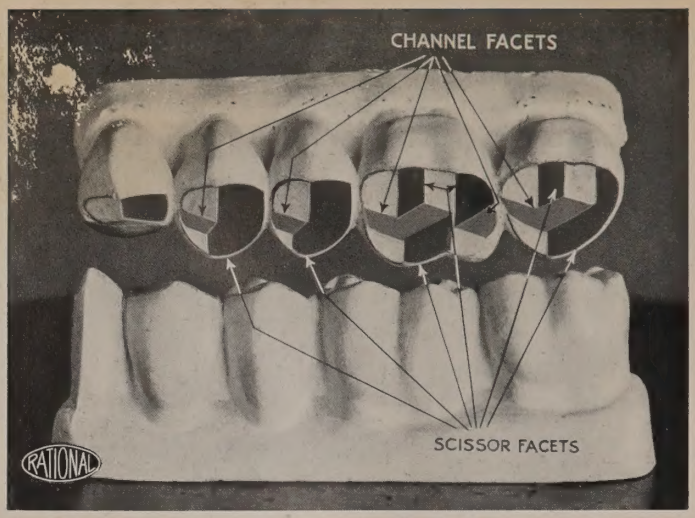


" Anatoform " dentures in lateral occlusion showing " working bite."

Carrying the consideration of this important feature of stability beyond the so-called conventional forms of posterior teeth, it will be seen that posterior teeth of mechanical design simply presenting channel facets or alternatively scissor facets will have similar limitations in regard to the possibility of adapting such teeth when set in alignment in a practical manner to conform to the movements of the jaw. The limita-



" Anatoform " dentures in lateral occlusion showing " balancing bite."



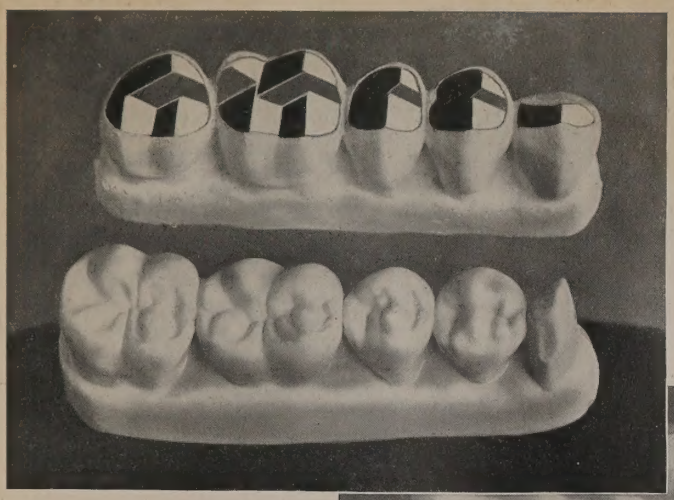
Basic mechanical carvings for "Anatoform" Teeth showing combination of channel and scissor facets.

tions referred to in the case of the conventional forms of teeth will indeed be supplemented through the fact that the broader contact surfaces presented in teeth of the mechanical designs referred to will limit jaw movements, for the reason that the teeth must follow the direction of the planes provided in their design and the jaw must follow the teeth. Any resistance to the direction of movement provided for in the mechanical design of the teeth or any lack of conformity of this direction to the direction of the natural jaw movement will inevitably result in displacement of the dentures from the ridges.

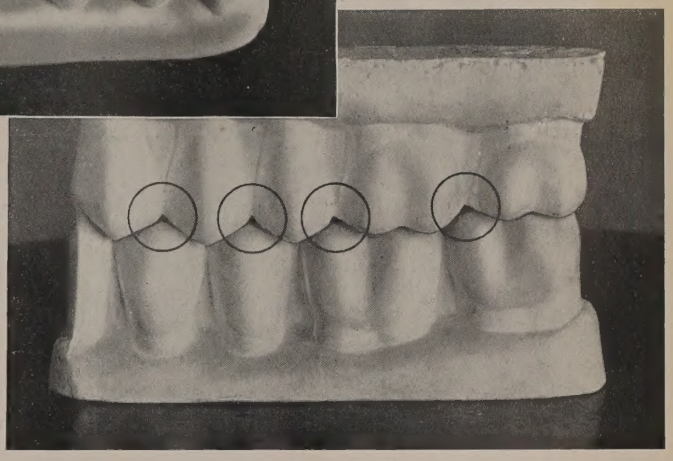
The question as to the practical quality of posterior teeth embodying a design where the shape and conformation of the cusps are "reversed" is answered by the results obtained from flat surfaces, because virtually in terms of stabilised occlusion such teeth set in occlusal alignment are flat surfaces.

With regard to teeth exhibiting literally a "pestle and mortar" design in occlusion, it is difficult to conceive that these would afford anything in the way of mastication possibilities, but this question is probably better answered in considering the qualities of the anatomical tooth, as designed by Professor Gysi in producing "Anatoform" Teeth.

Professor Gysi set about his work in a manner which deserves the highest compliment. He recognised the importance of teeth that permit free movement in all directions, by obviating interlocking cusps. In addition he worked also to present stabilising features, and to incorporate in teeth providing these features some masticating efficiency.



(Left) Basic Mechanical carvings of "Anatoform" Teeth (uppers) and responding lowers showing modifications to simulate natural form.



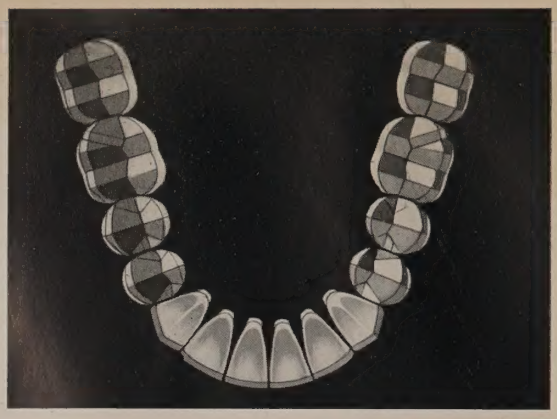
(Right) "Anatoform" Teeth occluded. The areas within the circles illustrate the inclusion of the "pestle and mortar" conception.

He recognised that, as distinct from anatomical considerations, certain conventional and mechanical features must be introduced if complete success were to be obtained. It can be seen, for example, that the quality of flat surfaces has been provided for, because the teeth designed by Professor Gysi can be so articulated as to present a freedom of movement in all directions just as great as if no cusps were present. Examination of the basic mechanical carvings before these carvings were modified to resemble natural tooth forms shows, running mesio-distally throughout the posterior teeth, a channel formation which antagonises with the corresponding facets on the opposing teeth. On the distal surfaces of the cusps and running bucco-lingually is to be found in effect a scissor formation.

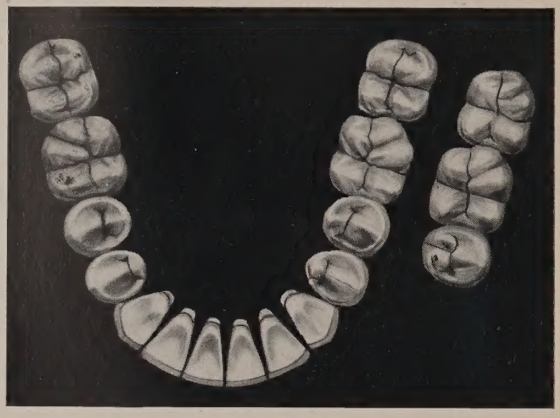
When these mechanical carvings, modified to resemble the natural teeth are studied, we have the well-defined sulci, providing such quality as may be found in "reversed cusp" teeth, and very definitely the "pestle and mortar" idea is to be noted in occlusion. This latter point is evident when it is noticed how the buccal cusps

olar teeth
ı the oppos-
of the upper
eeth.

The problem of anatomical articulation, over a period of years, may be said to have resolved itself along certain well-defined individual lines of research. So far as these researches have been applied to tooth design it is not surprising that concentration upon individual factors should have occurred in many cases with a disregard for other essential and related features of design.



Diagrammatic illustration showing directional planes providing freedom of movement and stability.

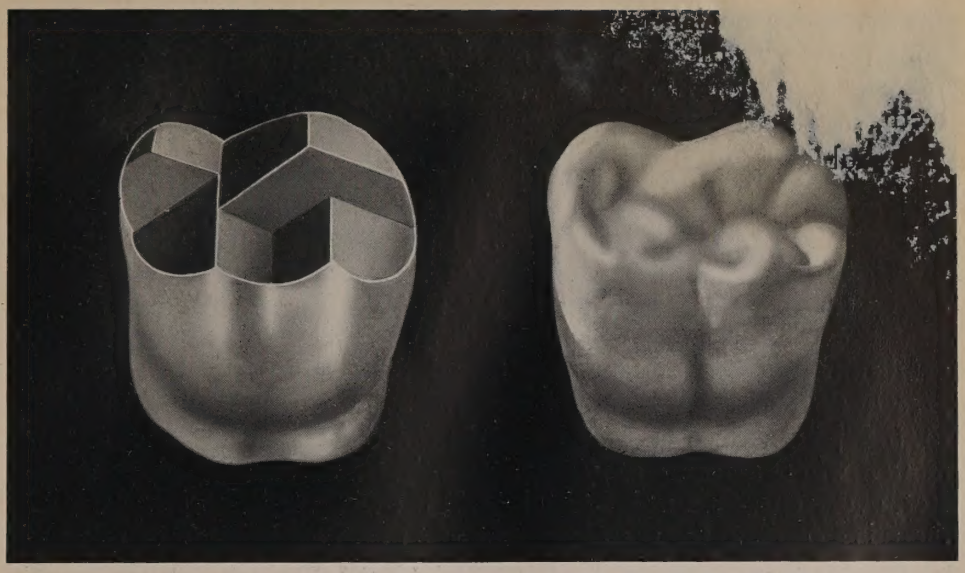


Cusps formed from directional planes ensuring balanced occlusion, comfort and masticating efficiency.

The work of Professor Gysi is noteworthy through the fact that a complete study has been given to each of the individual factors and in the final production of an artificial tooth, he has succeeded in incorporating all of the essential features evident in the design of the natural tooth—the design that nature has determined upon over thousands of years. His work also includes sound provision for the mechanical considerations required in artificial dentures.

Briefly, the " Anatoform " posterior tooth, as designed by Professor Gysi, may be said to be the epitome of the researches leading to tooth design assuring the practical replacement of tooth function by artificial means.

The artificial denture owing to its insecure nature will instantly be displaced if the teeth will not follow jaw movements. If it were possible more firmly to fix the artificial denture to correspond to the natural dentition, continual attrition would wear the tooth surfaces to conform to the direction of movement demanded. Professor Gysi, recognising this, provided a *direction* of movement in



Enlarged views of (left) basic mechanical carving of an "Anatoform" molar, and (right) modification to simulate natural form.

"Anatoform" Teeth, deciding that the *degree* of movement must be imparted at another stage, since it is impracticable to provide teeth presenting variations in degree.

Next, to consider natural cusp height. Experience has proved that to construct an artificial tooth presenting normal cusp dimensions would impose too much leverage on the insecurely fixed artificial denture. These cusp dimensions had to be modified. It is very interesting to note how this has been brought about.

Professor Gysi did not carve the tooth like the natural tooth and then modify this by a grinding process or by producing facets such as are to be found in the natural dentition, but he recognised the value in the complete design of a natural tooth: the fossæ, the sulci, the sharpness of the cusps, all of which play an important part in the mastication of food. "Anatoform" Teeth simulate in design natural teeth, modified in cusp depth and cusp angle to correspond to the cusp depth and angle that might be found in a patient 40—50 years of age.

Nor did he leave his tooth at the stage of mechanical precision, indicated in the above (left) illustration of the basic mechanical carving, recognising that such broad contacting facets would limit movements of these teeth, one upon the other, to the direction that he had given them. These mechanically produced surfaces were all rounded off (right illustration) to simulate natural crown surfaces which, when complete, present only points of contact of the rounded cusps and no

broad contacting surfaces whatever. By introducing these natural rounded cusps provision was made for the development of a tiny facet on some part of the cusp surface, as demanded by the individual case.

His work, with a view to obtaining maximum stability, determined that every tooth should be considered as an individual unit, and it is essential that the tooth should be so designed as to be capable of functioning as an individual unit in the setting up and arrangement of the teeth. An alignment of flat surfaces in setting up, such as is the case with flat conventional forms of teeth and teeth of mechanical design, presenting broad contacting surfaces, cannot present the necessary scope for adjustment of the masticating surfaces to the jaw movement. This adjustment is an extremely simple matter when a tooth of truly anatomical design is employed; in fact, every cusp is a unit in itself, and if owing to the particular case there is a demand for the placement of a tooth slightly out of relation to the neighbouring tooth, it merely means that in the automatic carborundum adjustment a little more well-defined facet will be developed on that particular tooth or cusp, according to the requirements of the case. It is a positive misconception to state that these cusps have to be ground to a state that changes their entire appearance or function.

" Anatoform " Teeth, set with an understanding as to the problems of articulation, in their final state, show only the minutest of facets produced by the carborundum adjustment process.

The anatomical design of " Anatoform " Posterior Teeth is an essential factor in the securing of consistently satisfactory results in dealing with the edentulous case. This design effectively provides for freedom of movement, stability and maximum efficiency in masticating effort.

PART TWO

Securing the Most Efficient Result from the Best Forms of Posterior Artificial Teeth

Securing the Most Efficient Result from the Best Forms of Posterior Artificial Teeth

The Importance of Tooth Alignment

THE maximum result from even the best of tooth forms cannot be obtained unless the teeth are aligned in a manner favourable to jaw movement.

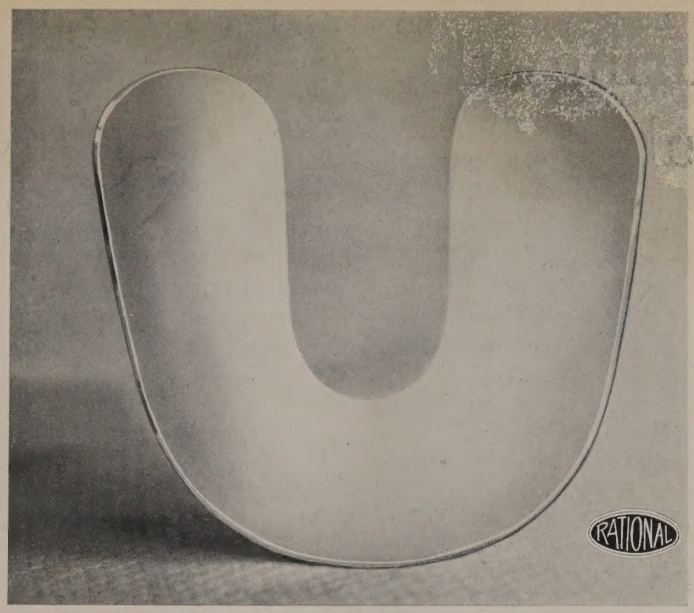
It would appear from close study of the work of the various authorities that nature has provided in the temporo-mandibular joint something so complex and so confusing in its various excursions as to defeat the endeavours of the dentist in his attempts at restoration.

To the practical worker, however, quite a different interpretation may be put upon these apparent complexities. The degree of movement in the temporo-mandibular joint may be considered as a very thoughtful provision of nature, for by this very mobility even the "Perseverance denture" is provided with some sensible degree of utility.

Anatomically, the condylar joint varies with different patients, likewise the degree of movement is variable, but the condyle in itself is very positive in its downward and forward movement along the glenoid fossa. This downward and forward movement will with extraordinary regularity in all patients register a segment of a curve.

So much being said, the essential requirement in connection with tooth alignment is to find a curve to which the artificial teeth may be set so that during jaw movements this curve (occlusal plane) will be in close accord with the condyle path, in both forward and lateral excursions, and the opposing surfaces of the teeth will remain in perfect balancing contact.

In the past such occlusal alignment has been termed the Curve of Spee, Compensating Curve or Stabilising Curve and its determination has been upon a more or less arbitrary basis. The endeavour in this new technique is to *rationalise* occlusal alignment by adopting a positive means for its determination which may be employed by every mechanic, with the help of the Compensating Curve Guide supplied with the *Rational* Articulator.



The Rational Compensating Curve Guide.

This Guide is cut from a section of a sphere and was arrived at in the following manner :—

Good impressions and snap bite were obtained and vulcanite base plates made to the models. On this vulcanite base the accurate bite record was obtained, great care being taken with regard to the centric relationship and the height of the bite.

These models and bites were then placed in an articulator frame and a series of bite blocks made to various lines, each, when in centric relationship, being in flush occlusion.

The bites were then placed in the mouth and the patient asked to carry out various jaw movements, the endeavour being to find a plane on which the surfaces of the upper and lower bite blocks would remain in stable occlusion, not only in centric relationship, but also in lateral and forward excursions of the jaw.

Of the several occlusal planes tested, a plane parallel to the nasal-auricular line proved to be more satisfactory in this respect than any other line, but naturally some movement was noticed, particularly at the periphery of the dentures, this on account of the fact that the jaw does not move along a straight plane.

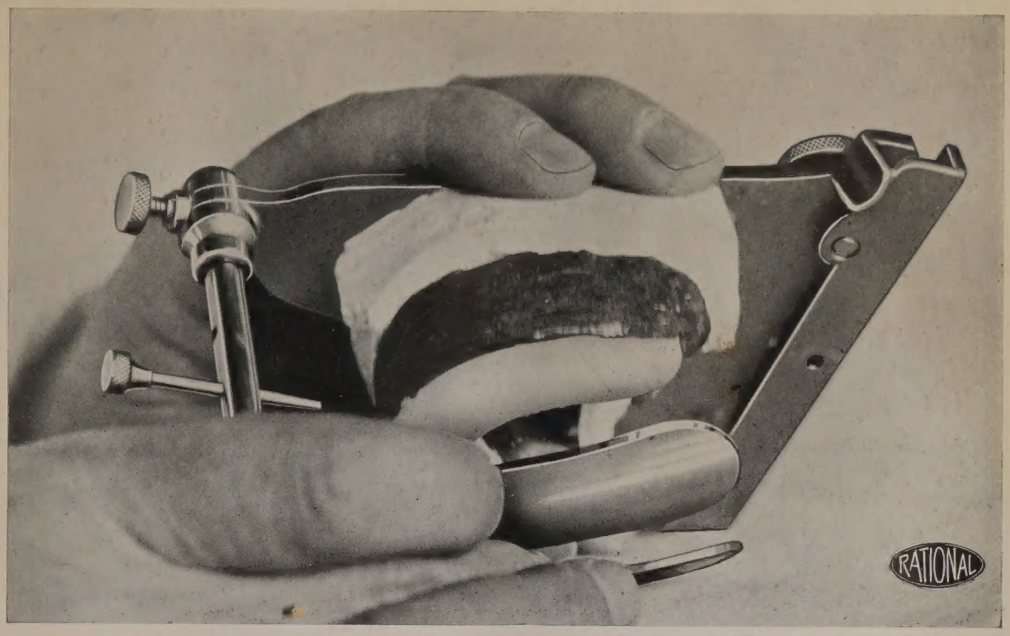
Having determined a manner whereby a close approximation of bite blocks to jaw movements could be registered in a practical working way, the bite blocks were then transferred to an experimental articulator, which was adjustable at the joint mechanism, and then the occlusal plane (based on the nasal-auricular line) was modified to various curves.

Development of the Rational Articulator. Adjusting the bite blocks to the Compensating Curve Guide.

The manner of modifying the occlusal plane to the curve was to rest the upper bite rim on the concave surface of a metal template and holding this in position, to pour soft plaster from behind, filling the lingual aspect, the plaster flowing into those areas where the flat plane was not in contact with the concavity of the metal guide. The upper bite was then placed back on to its model, the lower bite block softened and pressed on to the reconstructed upper bite block. In this way, slightly curved surfaces were imparted to the occlusal plane, and the bites were again tried in the mouth.

Having obtained a curve which so closely approximated the jaw movements in a given patient as to present perfect contact between the two occluding surfaces in any movement, without exhibiting the slightest movement of the dentures around the periphery, this test was carried out on a series of patients, using the same occlusal plane (based on the nasal-auricular line), modified to the aforementioned curve.

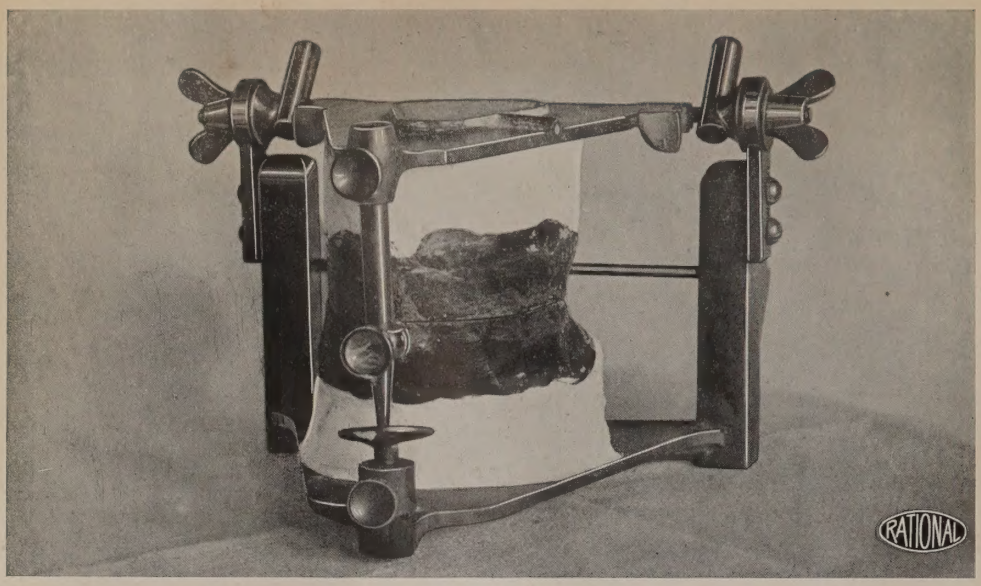
In every case it was found possible to obtain perfect apposition, irrespective of the fact that each patient must naturally show some little difference with regard to condyle path, lateral movement, etc. Notwithstanding these differences it was found that the bite blocks not only remained in constant firm occlusion in forward and side movements, but that the lower jaw could be exercised in any direction permitted by the joint without disturbing the bite blocks.



Development of the Rational Articulator. Removing Curve Guide from bite blocks after plaster adjustment.

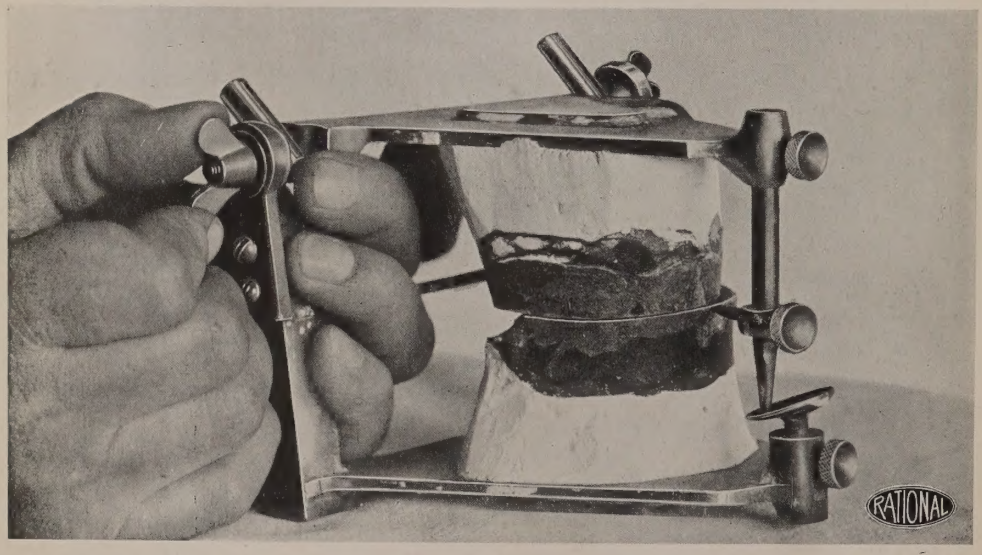
The differences in the natural condylar joint are no doubt taken up by the elasticity of the inter-articular cartilage, muscles, etc., which is not very surprising, considering the limited amount of movement in all directions that the jaw makes in ordinary functional activity.

Development of the Rational Articulator. The modified bite blocks.



Development of the Rational Articulator. Bites and models in experimental articulator frame.

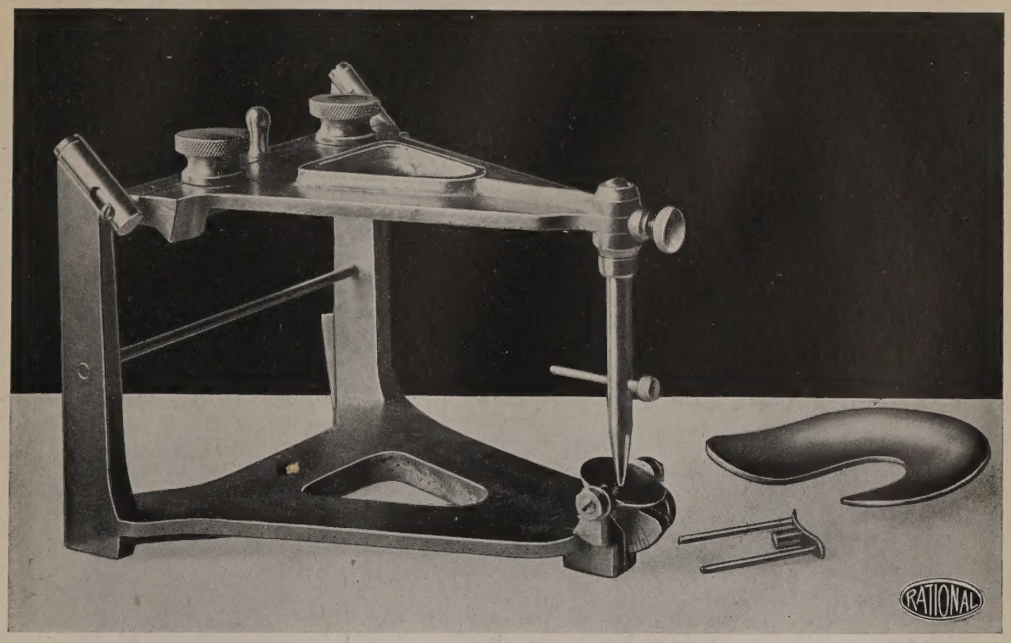
The bite blocks were now transferred to an adjustable experimental articulator on which the various jaw movements were repeated, allowing the curved bite blocks to influence the position of the condylar angle piece.
In this manner the condyle path was adjusted and afterwards fixed; this is one of the important features of the *Rational* Articulator.



Development of the Rational Articulator. Adjusting the experimental articulator to the angle and curve determined by the bite blocks. Note close occlusion of bites.

The RATIONAL ARTICULATOR

Design approved by Prof. Dr. Alfred Gysi



The Rational Articulator has a minimum of detachable parts. The only accessories are the Compensating Curve Guide and the Occlusal Plane Indicator.

THE *Rational* Articulator incorporates in simple design the essential features of a practical Anatomical Articulator, a positive method of tooth alignment, and a means of co-ordinating this alignment (Curve of Spee) with the movements along the condyle path. The *Rational* Articulator not only establishes correct tooth alignment in centric relationship, it also controls the alignment of the teeth in proper relation to the opposing teeth in lateral and forward excursions of the jaw.

The *Rational* Articulator assures in a definite and simple way the best result being obtained from the most efficient tooth forms, and serves as a guide enabling the mechanic to control in an intelligent way correct balance of the teeth and denture stability.

Just as "Anatoform" Posterior Teeth present a complete conception of the restoration of natural tooth design and function, so in the *Rational* Articulator is presented the mechanical conception of jaw movements.

In other words, the *Rational* Articulator, used in conjunction with " Anatoform " Posterior Teeth, places anatomical articulation on a tangible basis in place of an arbitrary basis as heretofore.

In its construction full consideration has been given to laboratory procedure.

It is firmly and robustly built so that it cannot easily become damaged. There are no parts to get lost.

The models are safely secured to the frame without any danger of their becoming loose.

The top arm of the articulator may be thrown back to facilitate laboratory procedure.

The top frame may be easily and rapidly detached for such stages as " marking base plates " or " waxing up ".

The " Occlusal Plane Indicator " is supplied for the purpose of obtaining the necessary guide lines from the patient, ensuring correct orientation of models to the articulator.

The initial alignment of the teeth is controlled by an incisal guide pin and a cross-bar fixed at the rear part of the articulator frame.

The modification of this initial alignment is made by the " Compensating Curve Guide," supplied as an accessory to the Articulator.

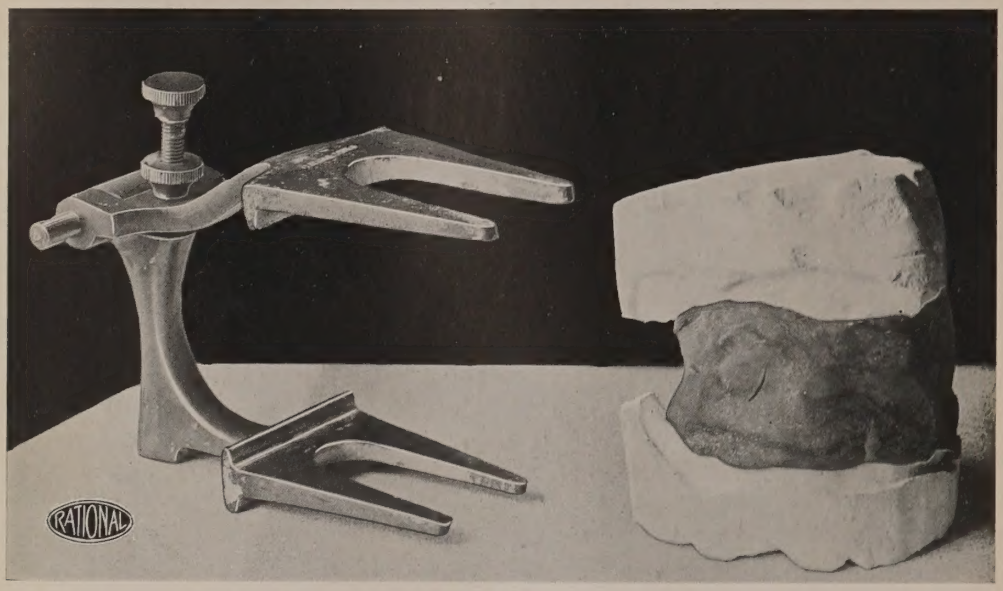
The *Rational* Articulator incorporates all of the valuable features, both mechanical and anatomical, desirable in an articulating appliance. Its employment will assure consistently the most efficient result from the best forms of posterior artificial teeth.

PART THREE

The Rational Technique Described.

The RATIONAL TECHNIQUE DESCRIBED

FIRST good impressions should be obtained. Positive results in this important basic operation are secured with individual trays conformed direct to the mouth with Ash's Black Impression Tray Compound and a "wash" method, using De Trey's Dentocoll Impression Material. At the time of obtaining the impressions a "snap" bite is an important adjunct. This is quickly obtained with the specially prepared beeswax described on page 36. In taking the "snap" bite it is very problematical if the accurate bite will be registered, but by this means a reasonably correct apposition of the models is obtained, which simplifies the making of bite-blocks, minimising to the greatest extent the necessity of adjustment in the surgery.



Models and "snap" bite assembled. An ordinary fork articulator may be used when making up bite blocks.

The models and "snap" bite are assembled and placed in a fork articulator; no precision is expected at this stage of mounting the models to the frame.

Adjust articulator frame to what may be considered a correct height of bite.

(NOTE.—It is not practicable to open and close a bite on the articulator, but the "snap" bite is purely an approximation and is

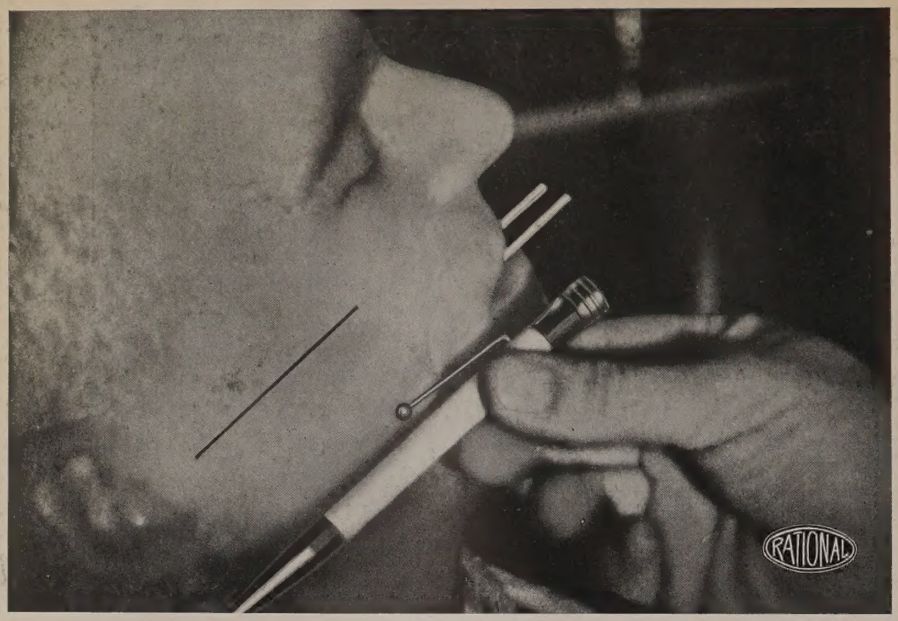
Bite blocks prepared.

intended to act as a guide in making the bites, limiting considerably work in the surgery. For instance, whatever faults may exist in regard to correct opening, or, as is frequently the case, forward protrusion, we have in taking the " snap " bite the assurance that both sides have closed equally.)

There are several bite methods advocated by different authorities as being better methods. In this technique, however, it is felt that by directing this stage along the lines of common practice the advantages of the technique will more rapidly achieve general acceptance than by the prescription of a bite-taking method which, while being good in theory, requires considerable practice to assure the result that the particular method is capable of giving.

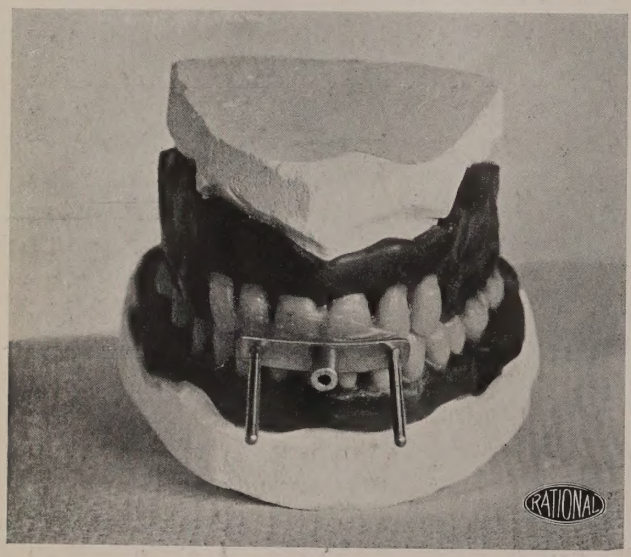
Here it is suggested that the bites should be formed by completely setting the lower teeth, using base plates and setting the teeth over the ridge. (In many cases it is possibly best to leave out the second lower premolar.) The upper bite block is then formed, setting the anterior teeth in what might be considered their correct relationship to the ridge.

The advantage of setting the lower posterior teeth in place of wax blocks is that this prevents that sliding of the bite blocks which so often takes place when wax surfaces are in opposition.



Establishing Occlusal Plane. Occlusal Plane Indicator must be paralleled to the nasal-auricular line.

If an obviously false protrusive bite has been taken, the upper anterior teeth will not assume the overlapping position. In other words, the teeth are set to their ridges without any attempt to conform to normal antagonising position. Posteriorly in the upper bite, wax blocks are formed.

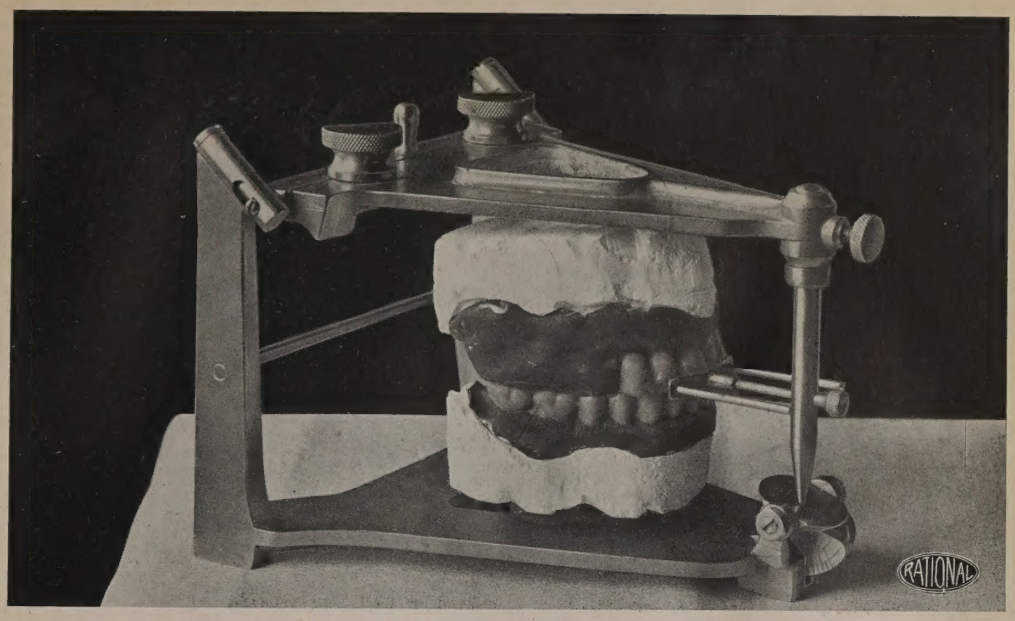


Bites and models assembled with Occlusal Plane Indicator waxed in position.

The bites are now, as far as can be judged, adapted to a normal opening.

In the surgery ordinary procedure is adopted. First establish height of bite, adding or cutting away wax to an equal degree on both sides.

The upper bite block is lightly passed over a flame (sufficiently to allow an imprint of the lower teeth to be obtained) and with



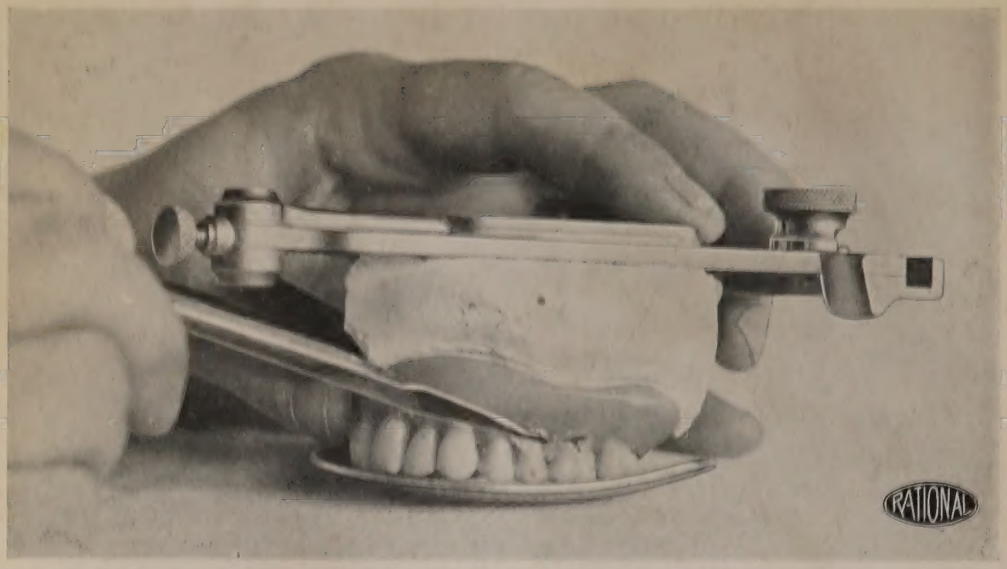
Bites and models assembled in the Rational Articulator, ready for plastering. Incisal guidance pin should be withdrawn to allow top part of frame to be lifted for plastering.

the waxed-up lower denture is placed in position in the mouth and the patient asked to " close " (do not instruct to " bite," but " close "). After removing the waxes from the mouth and chilling in cold water they can be returned to the mouth and the direction of the bite checked, also the height of bite.

It may be claimed by some that this is a retrograde step, but intensive testing out of bite methods has shown that this rather orthodox procedure is no less certain in its result than some of the more complicated methods which require considerable practice before any benefits are to be obtained.

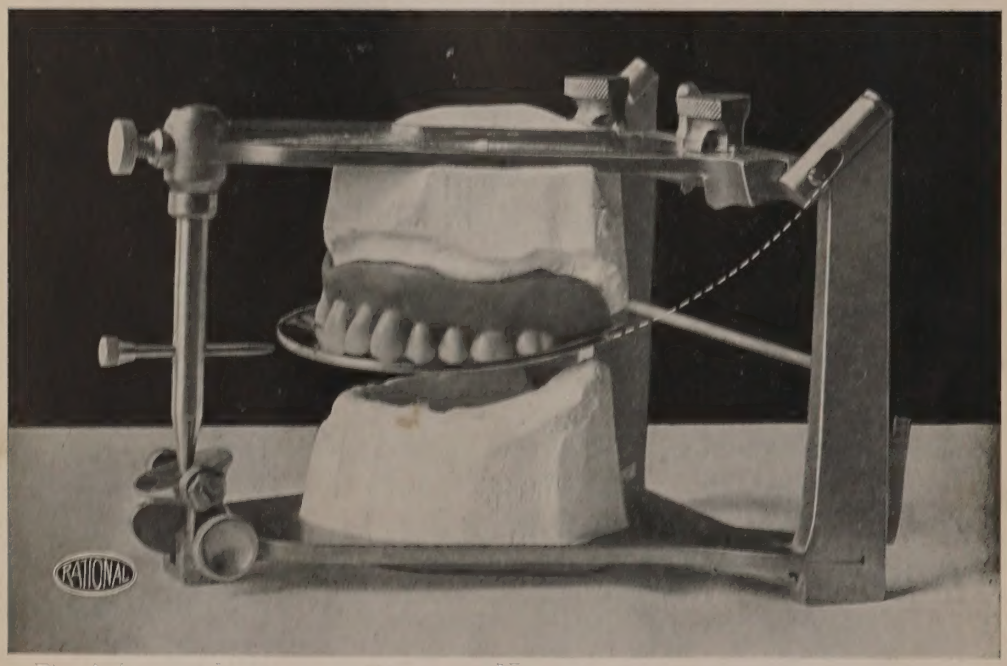
In fact, with bite-blocks formed and controlled as indicated, there is a simulation of the finished dentures, and bite registration by the method outlined requires *no conscious effort on the part of the patient;* consequently *normal closure* is assured. It is as unusual to get a wrong bite by this method as it is to get a correct bite by many other commonly adopted methods.

Having determined the correct bite, the Occlusal Plane Indicator is now used. Using a good sticky wax, attach the curved plate of this device to the anterior teeth so that the centre hole is in centric relationship, and marks the length of the upper anterior teeth. The purpose of the lateral pins is to control (by sighting) that the occlusal plane is in the same direction as the nasal-auricular line.

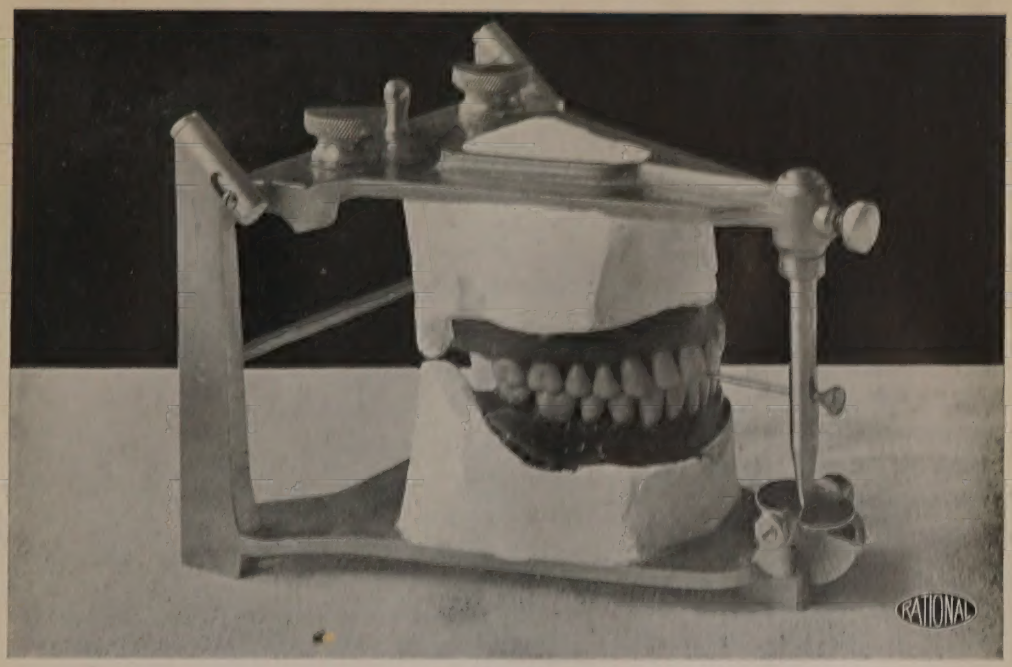


Adjusting the upper teeth to Compensating Curve Guide.

In order to determine the latter, it is as well to mark the line on the patient's face on one side. This is obtained by resting a flat edge from the external auditory meatus to the ala of the nose. The Occlusal Plane Indicator is then paralleled to this line. Be sure that



The teeth adjusted to Compensating Curve. Note: This curve corresponds to the curve of Articulator joint.



The complete "set-up."

the Occlusal Plane Indicator is firmly attached to the anterior teeth so that there can be no question of loss of position during the orientation of the models to the Articulator frame.

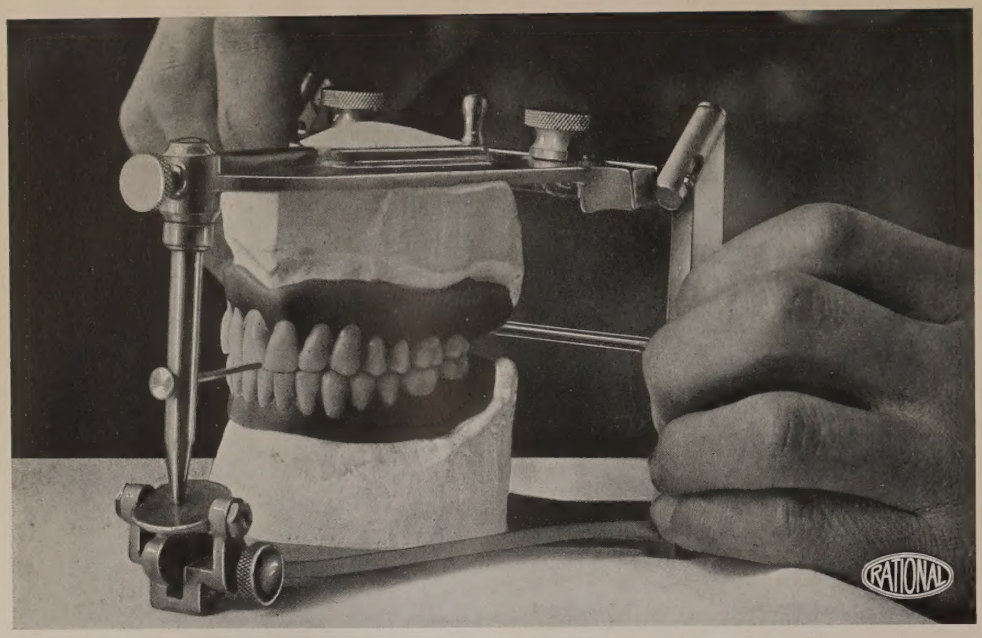
Assemble bite blocks and models. Support the assembled models and bites on "plasticine" (or clay), passing the centre incisal guidance pin through the front support post of the Articulator to engage with centre hole of Occlusal Plane Indicator.

The lateral pins, left and right, should be controlled, assuring a correct horizontal position of the models. Antero-posteriorly the lateral pins of the Occlusal Plane Indicator should be directed to the cross-bar on the back frame of the Articulator.

Withdraw incisal guidance pin from Occlusal Plane Indicator to allow top frame of Articulator to be lifted for plastering purposes. It is necessary to use fairly loose plaster and also to wet the models before plastering in order to assure the plaster flowing.

When the plaster is set and the upper model fixed, the top frame with the models suspended can be lifted, the clay removed, plaster mixed, poured through and heaped on the lower part of the articulating frame, when the top arm of the articulating frame carrying models is pressed down in the loose plaster, the front supporting post controlling the height.

The upper teeth are now set to the occlusal plane, with the exception



The " working bite."

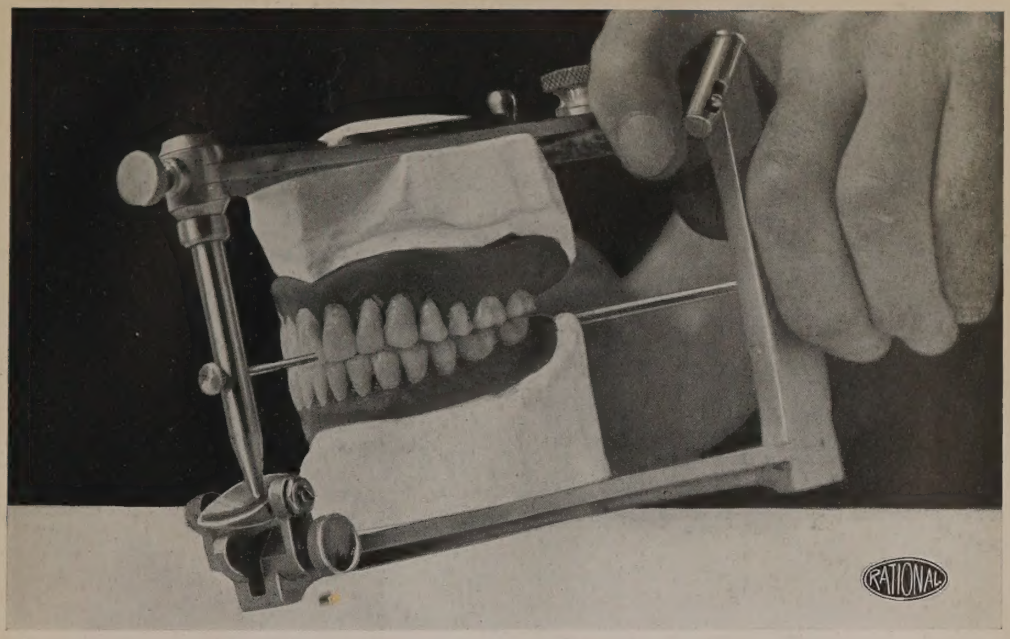
of the second molar, which must be treated independently (see page 33), the alignment being gauged by the eye. The upper teeth are then adjusted to the Compensating Curve Guide. (See illustration page 26.)

This is the manner of modifying the plane based on the nasal-auricular line to the curve mentioned in Part Two (page 16).

The lower teeth are now set, commencing with the first lower molar, working forward on either side, and then adjusting the lower anterior teeth. The second lower molar is the last tooth to be positioned (see page 33).

The case is now ready for automatic adjusting. Carborundum powder is mixed with water and painted over the occluding surfaces of the teeth. The teeth are now lightly ground together, when the light pressure used in holding the two models in position will have the effect of moving the teeth slightly and developing minute facets on some part of the cusp surface, but permitting free sliding movement.

The case is now tried in the mouth to control æsthetic arrangement and accuracy of bite, after which check the cases are vulcanised in the ordinary way.



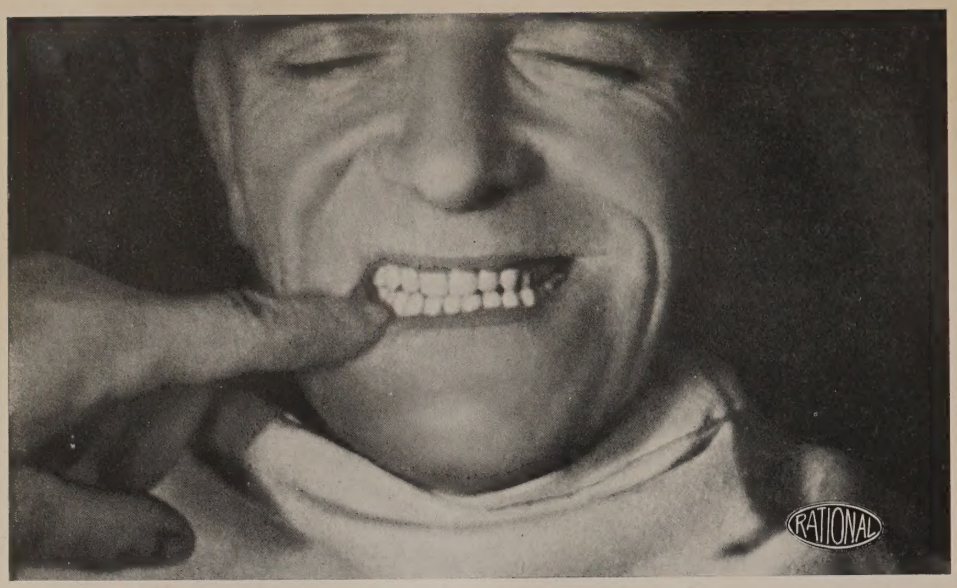
The "balancing bite."

It is frequently stated that teeth move considerably during vulcanisation. This definitely need not be so and it should be possible after vulcanisation to remount the dentures in the articulating frame without showing any perceptible change in the teeth as far as sliding contact is concerned. Spot grinding should certainly not have to be resorted to, as this implies a faulty bite, which negatives very largely the quality of the work, irrespective of articulator or technique.

The finished case is now inserted in the mouth of the patient and further adjustment by light automatic grinding with a mixture of carborundum powder and water is recommended as the final stage, this process to be carried out in the mouth, the patient being directed to exercise normal jaw movements.

Again, it is repeated, that when this final carborundum adjustment is completed and the occlusal surfaces of the teeth examined, very close inspection is required to perceive the fine facets produced.

"Anatoform" Teeth are so designed as to present in the cusp formation surfaces which are rapidly and simply modified during this final carborundum adjustment. There are no broad contacting surfaces and consequently no great amount of adjustment is necessary.



Finished dentures in the mouth in lateral occlusion. Note stability.

To state that "Anatoform" Teeth require an amount of grinding that changes their character is entirely fallacious. The resultant dentures :—

(1) Provide maximum comfort.

(2) Permit free movement.

(3) Present no high spots, even in various jaw excursions.

(4) Apply no undue stress to the temporo-mandibular joint.

(5) Ensure equal masticating efficiency throughout the complete denture through perfect balance.

(6) Are provided with guiding facets which maintain favourable and normal occlusion and preserve facial outline.

(7) Retain their adaptation to the underlying tissues over a much longer period than usual, owing to equalisation of stresses.

This statement of advantages is prompted by the results obtained in edentulous cases, carefully controlled over a period of twelve years.

A few helpful observations on Balanced Occlusion and the Positioning of the Second Molar.

Balanced Occlusion

Owing to the prevalence of misunderstanding regarding the advantages of balanced dentures, it is thought advisable in these pages to treat the matter separately.

It has been said that balanced occlusion is a quality more apparent than real. The conditions presented in normal natural dentition are invariably quoted in support of this opinion. Considerable trouble has been taken by various authorities to prove that in the normal natural dentition, balanced occlusion is not evident. Further statements have been made to the effect that the smallest object interposed between the teeth of artificial dentures throws them out of balance, in consequence of which the quality of stability which has been assumed to be the sole purpose of balanced occlusion, is lost and is therefore of no practical value. By the balancing of dentures, no panacea can be claimed for all of the difficulties associated with the edentulous case, but it is wrong to discard this important feature as though it were without value.

When the natural jaw is thrown forward and the condyles rotate slightly, so that the anterior teeth engage, the posterior teeth will be found out of contact. Similarly, in lateral movement, when the cusps of the teeth engage on the working side, the teeth on the opposite side are again out of contact. This is of no importance to the natural dentition where the teeth are firmly seated in the tissues. On the working side, however, it should be noticed that every tooth assumes contacting relationship. This is even so in cases of irregularity, the functioning of the jaw causing the teeth to move so that efficient tooth contact is preserved on the working side. Freedom of movement is also pronounced.

Idiosyncrasies on the part of the patient pass unnoticed in the natural dentition, as with patients who develop a habit of chewing more on one side than on the other. Observers, however, are agreed that such unequal distribution of masticating forces tends to produce tooth troubles and early loss of teeth.

In the case of artificial dentures this effect resolves itself in a loss of adaptation of the dentures to the underlying tissues, setting up further unequal resorption. Consequently, balancing the dentures offers a means of controlling equalised masticating efficiency and assures for a longer period the adaptation to the tissues.

Again, individual natural teeth which impinge during jaw excursions, will give rise to considerable discomfort. This is a common fault to be found when fillings are present. The case of a "high" filling is an illustrative example.

In centric relationship the fillings may permit even closure. In certain jaw excursions, however, hard contact is observed which the patient is early conscious of, causing him continually to direct the jaw to this point in nervous consciousness which seldom ceases until the surface of the filling has been modified.

Imagine a similar effect with artificial dentures which relatively are so insecurely fixed. Who has not had a patient complain that by a simple movement of the jaw to the left or right, or maybe forward, the dentures are displaced ? If this occurs in the early stages of denture wearing it destroys the patient's confidence and he is ever conscious that at some inopportune moment the teeth may be displaced.

For these reasons balanced occlusion should be aimed at, for it very definitely obviates such untoward possibilities. Those who contend that there is no value in balanced occlusion may just as well suggest that in the case of a restricted arch there is no value in positioning the teeth over the ridge because they do not follow anatomical alignment.

For the purpose of argument let it be conceded that balance has little purpose during the period of mastication. The average person spends two hours a day at meals. There are, however, still twenty-two hours, eight of which may be considered as the period of sleep, leaving fourteen hours. Should it not be considered that during these fourteen hours possibly the teeth are brought into firm contact some hundreds of times, at any one of which the dentures are likely to be displaced unless the closure is definitely centric and balanced. Furthermore, every time a patient swallows, for instance, the teeth are brought into contact.

The construction of an efficient edentulous case is still essentially a mechanical problem and only with the full appreciation of mechanical factors will the desirably higher degree of success be attained in the edentulous case.

The *Rational* Technique definitely assures Balanced Occlusion, and in this one essential alone will lighten the task of the dentist confronted with the need to provide the greatest possible means of satisfaction for the edentulous patient.

That Last Molar

The second molar in an edentulous case really deserves a chapter to itself. It is the *bête noire* of the edentulous case. Here are some of the *ills* associated with this tooth :—

Cheek biting in the case of elderly patients.

When set to an exaggerated curve it is responsible for excessive pressure on the underlying tissues.

When the alveolar ridges are close it is frequently ground to such an extent as to present little anchorage in the vulcanite.

It is frequently set very far off the ridges, disturbing mechanical stability.

In the lower denture it may restrict tongue space ; in short, it is a tooth that all too frequently requires some modification from its original design.

The following suggestions are advanced with a view to assisting a decision in regard to the placement of the second molar in such cases as the following :—

In cases where the arch is so restricted as to limit the positioning of this tooth it is far better to leave out the second bicuspids, permitting the second molars to be set to some functional purpose. In this way many cross-bite cases may be set to normal articulation.

When it is advisable to set "the last molar" to an acute curve, so that the direction of force is as nearly as possible at right angles to the lower ridges, this second molar should be spot ground so that during forward and lateral movements it does not convey any undue pressure to the antagonising surface.

NOTE:

Cases will be experienced where in forward movements the lower second molar is brought into hard contact with the distal cusps of the first upper molar. In lateral excursion the lingual cusps of both the first and second upper molars

are brought into hard contact with the buccal cusps of the second lower molar. In such cases these surfaces should be well relieved by spot grinding on the articulator, after which it may occur that in centric relationship these teeth will not be in contact. This is of no importance; in fact, it is better so.

Examination of the ridges in seventy-five per cent. of cases will reveal a cross-bite condition in the posterior region. To meet this condition the upper molars may be ground to cusp to cusp contact instead of the upper molar overlapping the lower molar as is normally the case.

Exact occlusion is not important in "the last molar," all that is required being sufficient contact to maintain the balanced occlusion.

An example of another kind may be cited in the case of an elderly patient, presenting flabby cheek tissues intra-orally. Here it is advisable to leave out the second bicuspids in the series. This will afford greater scope in the placement of the second molars. It is far better to have an efficient set of twenty-four teeth than a troublesome set of twenty-eight.

The essential factor is to provide balanced occlusion for the twenty-four teeth upon which the stability of the denture is to depend.

PART FOUR

Appliances and Materials necessary for the Rational Technique

A product of our London factory

Ash's Black Impression Tray Compound

Accuracy in every procedure is the keynote of the *new Rational* Technique. By constructing an individual tray for each patient with Ash's Black Impression Tray Compound, all the faults arising from the use of ill-fitting impression trays are avoided.

The impression material is carried to every area necessary in the making of the denture, equal pressure is assured in all directions and displacement of border and attachment tissues is avoided.

Special trays are rapidly made and conformed to the mouth by a simple process which is fully described in a booklet packed in every box of Compound.

English Beeswax

Specially prepared for the *Rational* Technique

For taking the "snap" bite, a material that is easily softened, malleable and unobjectionable to the patient is required. Ash's specially prepared English Beeswax is recommended for this purpose in the *Rational* Technique.

It enables the "snap" bite to be obtained quickly and with the greatest possible degree of accuracy.

De Trey's Dentocoll

The

Impression Material

for the Rational Technique

Accuracy of surface fit and border adaptation are essential in the construction of a satisfactory edentulous case, and both are assured in the *new Rational* Technique by taking the impression by a " wash " method employing De Trey's Dentocoll.

The elastic nature of De Trey's Dentocoll Impression Material plus the fact that pressure is not required, ensures a faithful reproduction of rugæ and all surface detail, rendering the production of close-fitting, comfortable dentures a practical possibility.

Literature describing the unique properties and wide uses of De Trey's Dentocoll is obtainable free on request.

A product of the laboratories of De Trey Brothers, Limited, Zurich, Switzerland.

CALĒSTONE

The Perfect Model Plaster

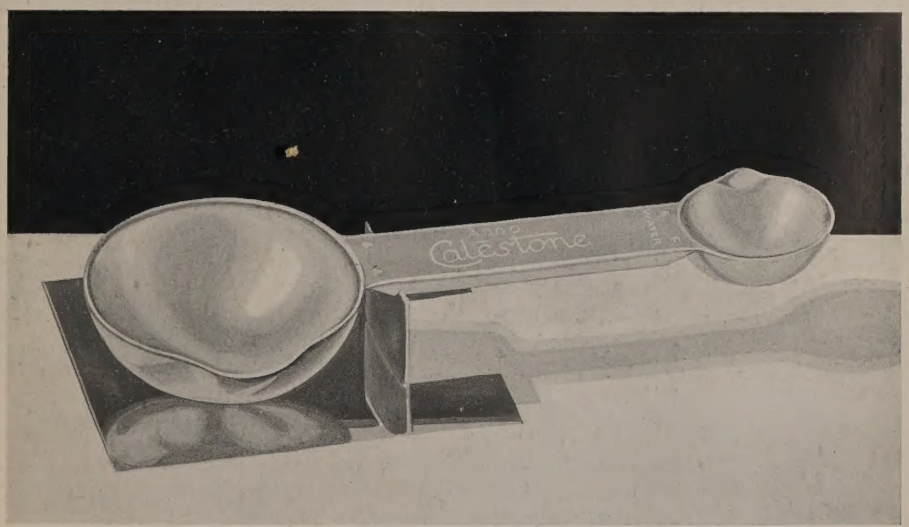
In pouring the impression for the *Rational* Case, a degree of all-round satisfaction hitherto unattainable is secured by the use of CALĒSTONE—a new, improved plaster presenting the following distinct advantages.

MAXIMUM PRECISION. —CALĒSTONE has such a low linear expansion as to eliminate, virtually, the troublesome inaccuracies frequently experienced as the result of undue compression of the plaster model. CALĒSTONE safeguards the accuracy in reproduction secured with De Trey's Dentocoll, prevents thickening of the vulcanite, and thus is a further essential factor in the production of close-fitting, comfortable dentures.

EXCEPTIONAL STRENGTH AND HARDNESS. —CALĒSTONE provides a harder and stronger model—a *stone-hard* model which will withstand the most severe handling in the laboratory. The surfaces of a CALĒSTONE Model remain undamaged and ridges and all fine detail are preserved intact for any length of time.

SAVING OF TIME. —CALĒSTONE eliminates the annoying waste of time which frequently occurs when slow-setting plasters are used. Mixed in accordance with the directions supplied with every canister, CALĒSTONE sets in normal Plaster of Paris setting-time and remains firm during vulcanisation and similar operations.

CALĒSTONE is readily mixed, economical in use, and presents a fine, smooth surface. Its colour is distinctive, being of a pleasing pale green shade.
To facilitate practical laboratory procedure, each Canister of CALĒSTONE contains two measuring cups indicating respective quantities of CALĒSTONE and water. To ensure definitely correct proportions, however, the use of the special CALĒSTONE BALANCE is recommended.



Calēstone Measuring Balance

This simple measuring balance determines immediately the right proportions of CALĒSTONE and Water for a perfect mix. It ensures a degree of accuracy impossible to obtain with individual measures and thus enables the remarkable qualities of CALĒSTONE to be developed to the full.

CALĒSTONE and the CALĒSTONE MEASURING BALANCE are of British manufacture and are obtainable from all regular dental dealers.

The Rational Articulator

Design approved by Prof. Dr. A. Gysi

The new principles incorporated in the *Rational* Articulator not only serve to minimise laboratory procedure, but also effect a saving of time and effort at the chairside. By enabling the mechanic to control tooth balance and denture stability before the dentures are tried in the mouth, the *Rational* Articulator renders repeated visits of the patient unnecessary.

The *Rational* Articulator ensures that full advantage is secured from the scientific features of tooth design for the restoration of functional efficiency developed by Prof. Gysi in " Anatoform " Teeth.

The practical mechanical features and sturdy construction of the *Rational* Articulator, and its two simple accessories—The Compensating Curve Guide and The Occlusal Plane Indicator—are described in detail on pages 19-20. Above, they are shown with the distinctive packing in which they are presented.

Full directions for the use of the *Rational* Articulator are included in every box.

Made with extreme precision by craftsmen in our Walton-on-Thames plant.

Rational Mounting Wax No. 1

Rational Wax is specially rolled and toughened to withstand mouth temperature without softening.

It is composed of the highest grade ingredients and is manufactured by a process perfected through years of experience in the preparation of dental waxes. Rational Wax does not shrink and is another link in the chain of quality products which guarantee the success of the *new Rational* Technique.

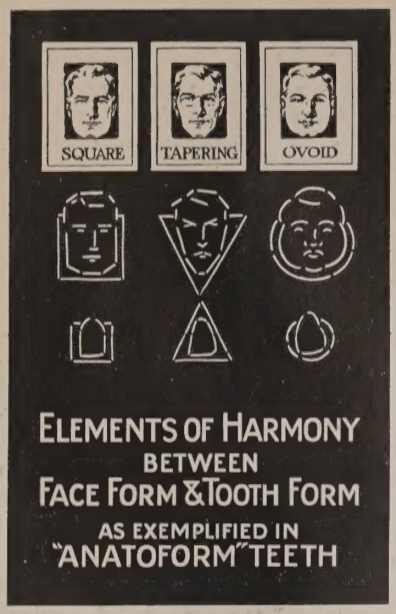
Prepared in our Walton-on-Thames factory and packed in ½ lb. and 1 lb. boxes.

Ash's Bite Plate Material

Recommended for use in conjunction with the *new Rational* Technique on account of its exceptional strength and toughness. Ash's Bite Plate material remains firm and rigid in the mouth during the bite-taking operation, thus enabling bites to be taken with great accuracy

It is easily softened over a bunsen flame, and can be adapted to the model in a few seconds.

Supplied in boxes of 12 rectangular sheets which are readily cut to shape.



"Anatoform" Anterior Teeth

Complete satisfaction for the edentulous patient means the successful restoration of natural appearance as well as function. The dentures must look the part as well as act the part they are constructed to perform. Each of these factors is indispensable to the other. Each demands the practitioner's most careful consideration and calls for wise discrimination in the choice of teeth products.

"Anatoform" Anterior Teeth with their unique æsthetic features offer you invaluable facilities for restoring natural appearance. For sheer naturalness, delicacy of form and shading, and those essential qualities necessary for true harmony with face form, "Anatoform" Anterior Teeth are without compare. Their inimitable, master qualities may be summarised as follows :—

ORIGINAL TYPAL FORMS. "Anatoform" Anterior Teeth are the original typal forms carved by Dr. Leon Williams, who first discovered that natural tooth forms, like face forms, belong to three basic types—Square, Tapering and Ovoid, and that nature's plan is to produce tooth forms in harmony with the face form. The range comprises 16 forms—6 Square, 6 Tapering and 4 Ovoid forms.

GRADED SIZES. Each form is supplied in a range of from 3 to 6 graded sizes, making in all a total of 64 sizes. This comprehensive range of sizes provides full scope for meeting individual mechanical requirements.

SCIENTIFIC CLASSIFICATION. The typal forms in graded sizes are graded and numbered progressively, thus eliminating confusion and enabling selections to be made systematically without loss of time.

LABIAL MARKINGS. "Anatoform" Anteriors, like fine natural teeth, have markings on their labial surfaces which prevent the glassy, unnatural appearance of plain glazed porcelain surfaces common in cheap forms of artificial teeth. These markings diffuse and soften the light, rendering the teeth inconspicuous in the mouth.

GRADED SHADING. Every set of "Anatoform" Anteriors is shaded in conformity with nature's colour scheme for the teeth. Each tooth possesses individual intensity of shade. From the point of high light in the upper centrals, the colour is softly rounded away, adding to the beauty of the tooth and enhancing the general appearance (see illustration on opposite page).

"SOLILA" PINS AND SPLIT RING ANCHORAGES. "Anatoform" Anteriors are as strong as they are beautiful. They have gold-clad headed pins soldered into split ring anchorages—the master principle of attaching tooth pins as used in "Solila" Teeth, the original soldered-in pin teeth. This principle is still the strongest known method of attaching tooth pins.

"Anatoform" Combination Sets

In "Anatoform" Combination sets the anterior pin teeth and diatoric posterior moulds, correctly matched for shade, well balanced and properly articulated, are presented as a complete unit comprising all the necessary elements for the highest form of full denture restoration. "Anatoform" Anteriors restore appearance as efficiently as "Anatoform" Posteriors restore function. Both represent, in their respective spheres, the highest achievement in the manufacture of porcelain teeth, and are distinguished by characteristics which original research and patient experimental work alone can produce,

"Anatoform" Combination Sets and the *Rational* Technique offer you ready facilities for the construction of dentures that do full justice to your professional skill—dentures that satisfactorily acquit you of your responsibilities to the edentulous patient—dentures that provide the patient with a measure of mental and physical comfort surpassing all expectations.

Normally, the standard articulation will be found entirely satisfactory, so that the task of selection is reduced to the simple procedure of determining which upper anterior mould will harmonise with the patient's type of face.

In the case of abnormal conditions, calling for an extra short or extra long set of posteriors or a wider or narrower set than those regularly carded with the anteriors required, the mechanically correct forms may be readily obtained. To facilitate selections in such cases, a chart is published indicating alternative posterior and lower moulds which can be adopted without complicating in the least the setting-up of the case or in any way impairing the perfect articulation of the denture. Copies of this chart are obtainable free on request.

"Anatoform" Teeth are made in the United States of America in the world's largest factory devoted exclusively to the manufacture of fine porcelain teeth. The word "Anatoform" is a registered trade name.

Reg. Trade Mark.

NATURE'S COLOUR SCHEME.

The distribution of colour throughout the set in "Anatoform" Teeth gives them an appearance so natural as to make detection of artificiality almost impossible.

"Anatoform" Teeth are the only artificial teeth "shaded in the set."

Special Rational Assortment
of
"Anatoform" Combination Sets

In conjunction with the presentation of the new *Rational* Technique for the Edentulous Case, a special assortment of "Anatoform" Combination Sets is offered as illustrated above.

This new Assortment has the following important advantages for purchasers of full sets for edentulous work by the *Rational* method: It provides a handy selection of forms and shades for chair-side use, answers fully to the modern requirement of elegant and pleasing presentation of materials in the surgery, provides a practical method of conserving stock, properly classified—and effects a worthwhile economy on the purchase price. The teeth are charged at the quantity rate and the handsome rexine-covered case is presented free.

The assortment contains 20 sets of 28 in moulds and shades in popular demand, but selections may be made in accordance with the purchaser's own specifications if desired. Refill facilities are available at every "Anatoform" Service Depot.

"Anatoform" Service Depots are to be found wherever dentistry is practised.

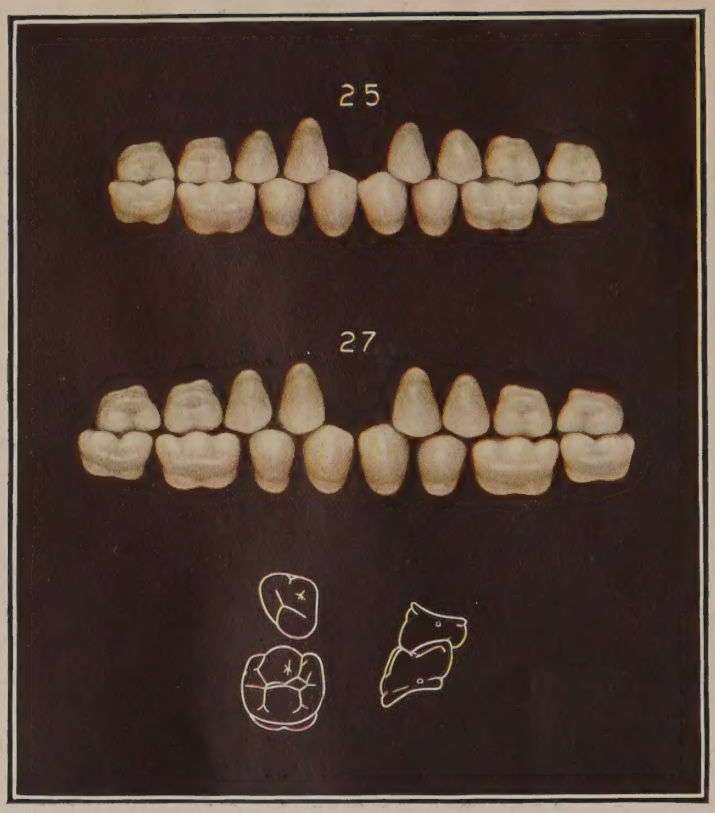
Special Rational Assortment
of
"Anatoform" Posterior Teeth

This assortment, which is also introduced in conjunction with the new *Rational* Technique, fills a long-felt need for a handy assortment of "Anatoform" Diatoric molars and bicuspids. It presents in compact form thirty-two sets of 16's uppers and lowers "Anatoform" Posterior Teeth (articulated sets) in moulds and shades in daily demand. If desired, however, the Assortment may be made up to individual specifications in regard to moulds and shades.

This new Assortment at once puts the dentist in possession of a comprehensive selection of the only posterior teeth with which the highly successful results rendered possible by the new *Rational* method are obtained.

The case in which the teeth are supplied is of good appearance, is strongly made and fastens securely. It is presented free, the teeth being charged at the prevailing quantity rate. Refill facilities are afforded at every "Anatoform" Service Depot.

"Anatoform" Service Depots are to be found wherever dentistry is practised. The word "Anatoform" is a registered trade name.



DR. GYSI'S

"Anatoform" Cross-Bite Teeth

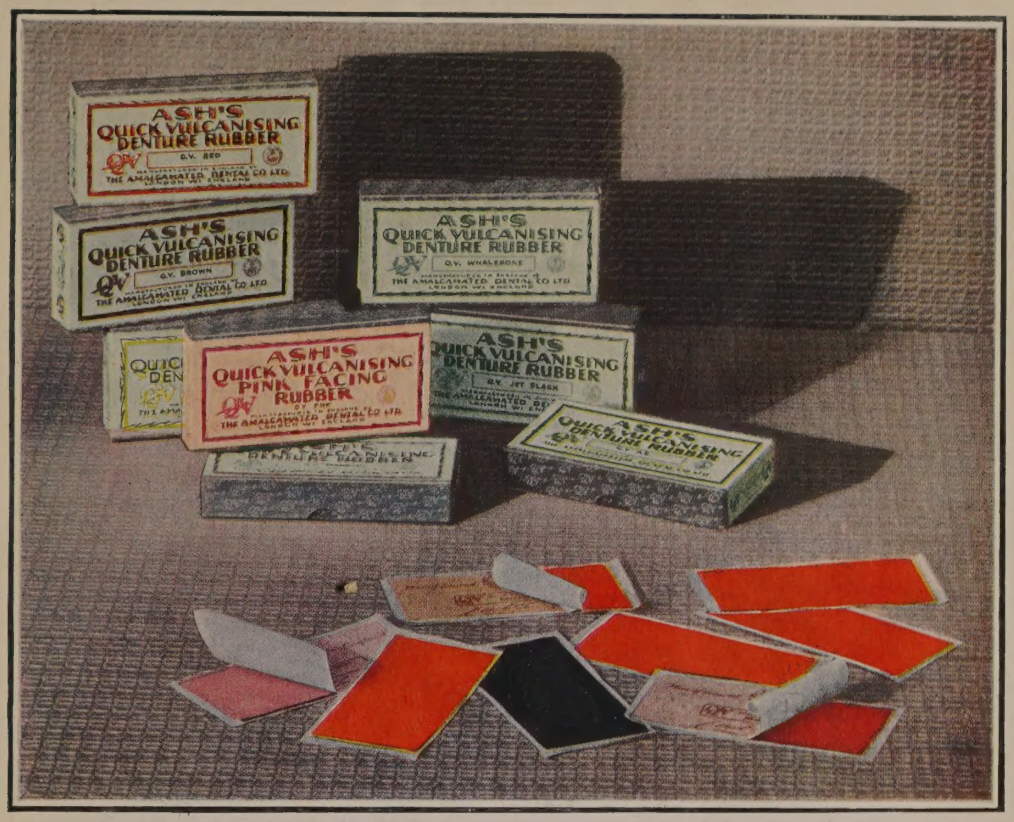
(*Patented*)

In cases of pronounced cross-bite abnormality the use of "Anatoform" Cross-Bite Teeth assures a greater degree of efficiency than is possible through any other means.

Designed by Dr. Gysi after exhaustive experimental work to meet the mechanical conditions in edentulous cases where the intra-alveolar crestline angle is less than 80°, these special molars and bicuspids, like normal-bite "Anatoform" Posteriors, also present unique anatomical features which effectively restore masticating ability.

"Anatoform" Cross-Bite Teeth leave more room for the tongue than any other teeth in cross-bite arrangement, they provide greater comfort for the patient and assure maximum stability. In a word, "Anatoform" Cross-Bite Teeth render the handling of the most difficult cross-bite case a matter of mechanical simplicity.

"Anatoform" Teeth are made in the United States of America in the world's largest factory devoted exclusively to the manufacture of fine porcelain teeth. The word "Anatoform" is a registered trade name.



Ash's Q.V. (*QUICK VULCANISING*).

Denture and Pink Facing Rubbers

Ash's Q. V. Rubbers are an entirely *new* development. They possess all the qualities of the well-known standard Ash Rubbers, with the additional advantage of greater speed in vulcanising, secured through the incorporation of a new component. Their use ensures a saving of at least 50 minutes on every case, with a correspondingly reduced gas consumption.

The economy in technician's time per case, the increase in output from the same vulcanising equipment and the fact that this new product costs no more than the standard Ash Rubbers make possible an important reduction in the over-all cost of producing satisfactory dentures.

This important economy factor, plus the fine strength, elasticity, non-porosity, easy packing and colour permanence features which this new product presents, especially indicates the use of Ash's Q. V. Rubbers in connection with the production of dentures according to the new *Rational* Technique.

Needless to add, these special features also are of particular value in repair work.

Ash's Q. V. Rubbers are available in 8 shades—a natural pink shade of Facing Rubber and a popular range of 7 Base Rubbers.

The Rational denture material—not a substitute for rubber but a new rubber

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Greater Efficiency RATIONAL *— with Economy*

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